METHODS FOR INVESTIGATING THE MECHANICAL PROPERTIES OF ISOLATED SUBENDOCARDIAL AND SUBEPICARDIAL CELLS FROM MOUSE HEART

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It has been shown previously that subendocardial cells (ENDO: inner layer of ventricular wall) and subepicardial cells (EPI: outer layer of ventricular wall) differ in their mechanical properties in ferret, rat and guinea pig hearts [1,2]. Although cardiomyocytes are exposed to various types of mechanical load in '*in situ*' beating heart, these previous studies were limited in variety of applicable mechanical load.

In the present study we investigate the differences in response to mechanical load between EPI and ENDO cells using our recently developed single cell stretch method. In this method, each cell end was held by a pair of carbon fibers to enable applying various types of physiological mechanical loads to the cells [3]. EPI and ENDO cells showed significant differences in response of mechanical properties to loading conditions. To predict electromechanical mechanisms responsible for the differences, we utilized our mathematical EPI and ENDO cell models that describe differences between them in properties of ionic currents and myofilament contractile mechanisms in their excitation-contraction coupling [4].

The present results suggest that combination of our new experimental method and modeling approach is potentially useful for understanding the underlying mechanisms of regional heterogeneity in response of myocardial function to mechanical loading conditions.

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